**IceCube Institutional Memorandum Of Understanding (MOU)**

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**University of Münster**

**Alexander Kappes**

**Ph.D Scientists** (Faculty Scientist/Post Doc Grads): **2** (1 1 3)

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| **Labor Cat.** | **Names** | **WBS Level 3** | **Tasks** | WBS 2.1 | WBS 2.2 | WBS 2.3 | WBS 2.4 | WBS 2.5 | WBS 2.6 | **Grand Total** |
| Program Coordination | Detector Maintenance & Operations | Computing & Data Management | Data Processing & Simulation | Software | Calibration |
| KE | KAPPES, Alexander | 2.1.1 Administration | Institutional lead | 0.20 |  |  |  |  |  | 0.20 |
|  |  | 2.1.1 Administration | Chair IceCube Impact Award committee | 0.10 |  |  |  |  |  | 0.10 |
|  | **KAPPES, Alexander, Total** | |  | **0.20** |  |  |  |  |  | **0.30** |
| PD | CLASSEN, Lew | 2.1.4 Education & Outreach | Public outreach | 0.10 |  |  |  |  |  | 0.10 |
|  | **CLASSEN, Lew Total** | |  | **0.10** |  |  |  |  |  | **0.10** |
| GR | BUSSE, Raffaela | 2.1.4 Education & Outreach | Public outreach | 0.10 |  |  |  |  |  | 0.10 |
|  |  | 2.5.4 Science Support Tools | Extension of NuFlux tool |  |  |  |  | 0.50 |  | 0.50 |
|  | **BUSSE, Raffaela Total** | |  | **0.10** |  |  |  | **0.50** |  | **0.60** |
| **University Münster Total** | | |  | **0.50** |  |  |  | **0.50** |  | **1.00** |

**IceCube Upgrade**

|  |  |  |  |  |  |  |  |  |  |  |
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| **Labor Cat.** | **Names** | **WBS Level 3** | **Tasks** | WBS 1.1 | WBS 1.2 | WBS 1.3 | WBS 1.4 | WBS 1.5 | WBS 1.6 | **Grand Total** |
| Project Office | Gen2 Enhanced Hot Water Drill | Deep Ice Sensor Modules | Comms, Power, and Timing | Characterization & Calibration | M&O Data Systems Integ. |
| KE | KAPPES, Alexander | 1.3.1 mDOM | L3 lead |  |  | 0.50 |  |  |  | 0.50 |
|  | **KAPPES, Alexander, Total** | |  |  |  | **0.50** |  |  |  | **0.50** |
| SC | CLASSEN, Lew | 1.3.1 mDOM | Development, characterization, simulations |  |  | 0.30 |  |  |  | 0.30 |
|  | **CLASSEN, Lew Total** | |  |  |  | **0.30** |  |  |  | **0.30** |
| GR | UNLAND, Martin | 1.3.1 mDOM | Development, characterization, simulations |  |  | 0.70 |  |  |  | 0.70 |
|  | UNLAND, Martin | 1.6.3 Simulation Software | Noise simulation |  |  |  |  |  | 0.10 | 0.10 |
|  | **UNLAND, Martin Total** | |  |  |  | **0.70** |  |  | **0.10** | **0.80** |
|  | LOZANO, Cris | 1.5.3 Array Calibration | Studies to determine hole-ice properties |  |  |  |  | 0.20 |  | 0.20 |
|  | **LOZANO, Cris Total** | |  |  |  |  |  | **0.20** |  | **0.20** |
| **University Münster Total** | | |  |  |  | **1.5** |  | **0.20** | **0.10** | **1.8** |

**Faculty:**

Alexander Kappes (Faculty) – Institutional Lead, L3 lead mDOM, Chair IceCube Impact Award committee

**Scientists and Post Docs:**

Lew Classen (Post Doc) – mDOM development

**Grad Students (PhD students):**

Cristian Lozano (PhD student) – Thesis topic: Sensitivity studies of IceCube-Gen2 detector with mDOMs

Martin Unland (PhD student) – Thesis topic: mDOM development and detailed module characterization

Raffaela Busse (PhD student) – Thesis topic: Constraining minimal Dark Mater models with data from the IceCube Neutrino Observatory

**Master students:**